



WATER RESOURCES RESEARCH GRANT PROPOSAL

Title: Effects of Biosolids on Water Quality

With increasing population density in the state of NH, production of biosolids (solid waste including sludge from municipal sewage treatment, food processing wastes, and sludge generated by treatment of paper mill wastes) has increased dramatically (NH DES reference; see proposal). At the same time that generation has increased, options for disposal have diminished and disposal costs have increased. One option for disposal of this waste stream is use of biosolids as a soil amendment to re-vegetate abandoned gravel pits. Abandoned gravel pits are numerous in New Hampshire, and lack of vegetation decreases property values adjacent to a site as well as providing a threat to water quality.

The proposed research will examine the impacts of gravel pit restoration with biosolids on groundwater quality. A field demonstration site has been established at a former gravel pit in Hooksett, NH. Current use of the site involves periodic application of biosolids, growth of a cover crop for several years to create a soil cover, and then removal of the created topsoil for use by the town of Hooksett in management of public lands and road rights-of-way. Matching funds will be provided by the state of NH and a private organization, the New England Biosolids and Residuals Association (NEBRA).

Previous research from this project in 1996 has shown that nitrate (NO_3^-) concentrations in soil solution are high at some sites, but groundwater appears to be relatively unaffected by biosolids applications (2 - 4 mg/L NO_3^-). The purpose of the project is to demonstrate whether adherence to Best Management Practices (BMPs) is sufficient to protect groundwater from contamination with NO_3^- and other forms of dissolved nitrogen, and identify possible ways to improve BMPs. Funding from the WRRC will be used to 1) increase sample frequency to provide better temporal resolution in groundwater chemistry; 2) install several recording pressure transducers that monitor changes in groundwater table in response to rain events, and 3) assess impacts of biosolids application on trace metal levels in groundwater. Inductively coupled plasma emission spectroscopy (ICP). Analyses will be conducted in the WRRC's Water Quality Analysis Lab with the exception of trace metal analysis, which will be conducted in the Plant and Soil Testing lab at UNH.

Flow injection analysis will be used to measure ammonium (phenol hypochlorite method) and nitrate (Cd reduction method). Dissolved organic nitrogen (DON) will be measured as the difference between total dissolved N (using high temperature catalytic oxidation and chemiluminescent NO detection; Hjerriam et al. 1996) and inorganic nitrogen. Trace metals will be measured using inductively coupled plasma emission spectroscopy.